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SURFACE-TO-AIR MISSILE FACILITIES

**KAPUSTIN YAR/VLADIMIROVKA
MISSILE TEST CENTER, USSR**

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PREFACE

This joint photographic intelligence report has been prepared by the Army, Navy, and Central Intelligence Agency in response to Army SR1 601-1-59 and CIA requirement RR/E/R83/59, as well as in partial response to JPRC/R22/59, Navy DNI Projects 436-59 and 417-60, and CIA requirements SI/R56/59 and RR/E/R84/59. The purpose of this report is to present a detailed photo analysis of the Surface-to-Air Missile Facilities at the Kapustin Yar/Vladimirovka Missile Test Center. It is planned to present a similar analysis of other facilities at the Test Center in subsequent reports.

Insofar as possible this report includes a comparison of [REDACTED] photo coverage. Observable changes between [REDACTED] are shown in green on the line drawings. Some of the illustrations are oriented with north at the bottom of the page so as to correspond with the orientation of the accompanying oblique photographic enlargements. All orientations are referenced to True North, and the term miles mentioned in the text refers to nautical miles. A table giving the geographic location of all functional areas will be found on page 29.

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SUMMARY

The Surface-to-Air Missile Facilities situated in the area north-northeast of Kapustin Yar, include an active SAM Launch Complex with an associated test range, a Base Support Complex, and an Initial SAM Launch Complex, now inactive or abandoned. The active facilities extend over a 180-square-mile area which is roughly rectangular in shape and extends 20 miles north-northeastward from the Base Support Complex through the instrumented portion of the associated test range. The Initial SAM Launch Complex is situated 10 miles to the east, outside the area of current SAM activity.

The active SAM Launch Complex, served by an excellent all-weather road, has its own first-echelon support facilities, which include separate storage and personnel housing sections. The large Base Support Complex, served by both road and rail, probably functions as a second-echelon support facility. Third-echelon support probably is provided by facilities at Kapustin Yar.

The grouping and orientation of the active SAM Facilities indicate that they function independently of other missile facilities at the Kapustin Yar/Vladimir-ovka Missile Test Center. For example, the SAM Test Range is oriented north-northeastward, along an azimuth of 20 degrees, in contrast to the generally eastward orientation of the SSM Range. Moreover, the SAM Range includes its own instrumentation, control, and guidance facilities. This independence of the SAM activities is further emphasized by the

orientation of internal road systems and buried cables as well as by the general absence of connecting roads between these and other facilities.

The SAM Launch Complex consists of four launch areas, an instrumented test range, and three support areas. The launch areas, which include an R&D Launch Area, a Prototype Herringbone Launch Area, a Troop Training Launch Area, and a New Type SAM Launch Area, are all oriented north-northeastward. Buried cables radiate downrange from an instrumentation site at the rear of the Launch areas to forward instrumentation sites, forming a quadrangular pattern which measures about 5.4 miles on a side. Support areas

and a Missile Checkout and Propellant Storage Area.

The Base Support Complex, located 7 miles south-southwest of the SAM Launch Complex, includes a Base Support and Housing Area, a Marshalling Area, and Kapustin Yar Airfield. The main road from Kapustin Yar to the SAM Launch Complex passes through the Base Support Complex.

The Initial SAM Launch Complex, which is served by road from Kapustin Yar, consists of a Launch Area and a Support Area, both apparently inactive or abandoned. The two areas are located one mile apart and are connected by an unimproved road.

It is apparent from photography that at least two surface-to-air missile sys-

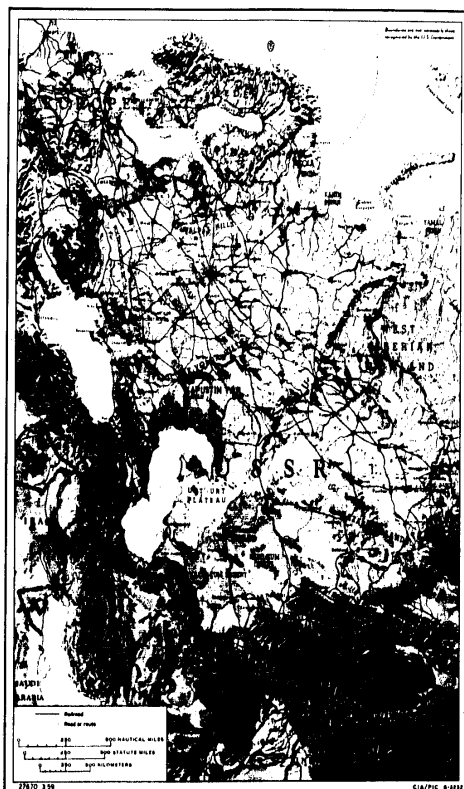


FIGURE 1. GENERAL ORIENTATION MAP.

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tems have been developed and a third is probably under development at Kapustin Yar. The first to be developed was the SA-1 (B-200) system, which utilized the Herringbone-type site. The SA-2 system was the second system to be developed.

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It is thus possible to trace the historical development of two complete missile systems by use of photography. One is the SA-1 (B-200) system utilizing the V-301 type missile. The development of this system started with missile testing at the Initial SAM Launch Complex. The second phase, utilizing segments of a launch site and components of guidance equipment, was carried out at the R&D Launch Area. The third phase was the testing of a prototype site utilizing the Herringbone pattern, and the final or fourth phase was the deployment of the Herringbone Launch Sites in a double ring around Moscow. A similar case can be made for the SA-2 system utilizing the Guideline missile. In this instance, the first and second phases were probably carried out at the R&D Launch Area and the third phase at the Troop Training Launch Area. The fourth phase is represented by the construction of Hexadic-type sites throughout the USSR.

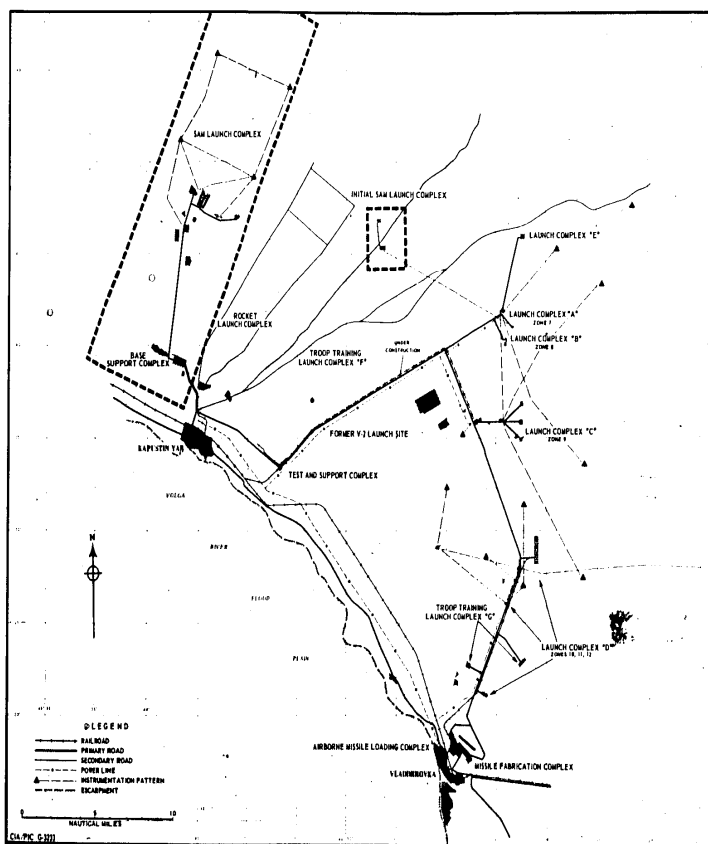


FIGURE 2. LOCATION OF SAM FACILITIES AT THE KAPUSTIN YAR/VLADIMIROVKA MISSILE TEST CENTER.

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INTRODUCTION

The Surface-to-Air Missile Facilities are a part of the Kapustin Yar/Vladimir-ovka Missile Test Center, which is located 50 miles east of Stalingrad, on the eastern side of the Volga River (Figure 1). These facilities, which occupy the northwestern

margin of the Test Center (Figures 2 and 3), include a prototype launch site for every surface-to-air missile defense system known to be deployed in the USSR. In addition, the [redacted] photography reveals a new probable low- or medium-altitude, short-range surface-to-air missile system under development. Close-in and base support facilities associated with these missile systems are also

evident. At least 60 surface-to-air missiles, positioned at two of the four launch areas in the SAM Launch Complex, have been identified on the same photography.

The SAM facilities were covered by small-scale oblique photography on [redacted] and again by excellent quality photography on [redacted]. Most of the detailed interpretation presented in this report is based on the [redacted].

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coverage, but whenever possible comparisons are made with [redacted] coverage so as to indicate changes during the interim period. For purposes of this discussion, the SAM Facilities are grouped in three complexes, the SAM Launch Complex, the Base Support Complex, and the Initial SAM Launch Complex.

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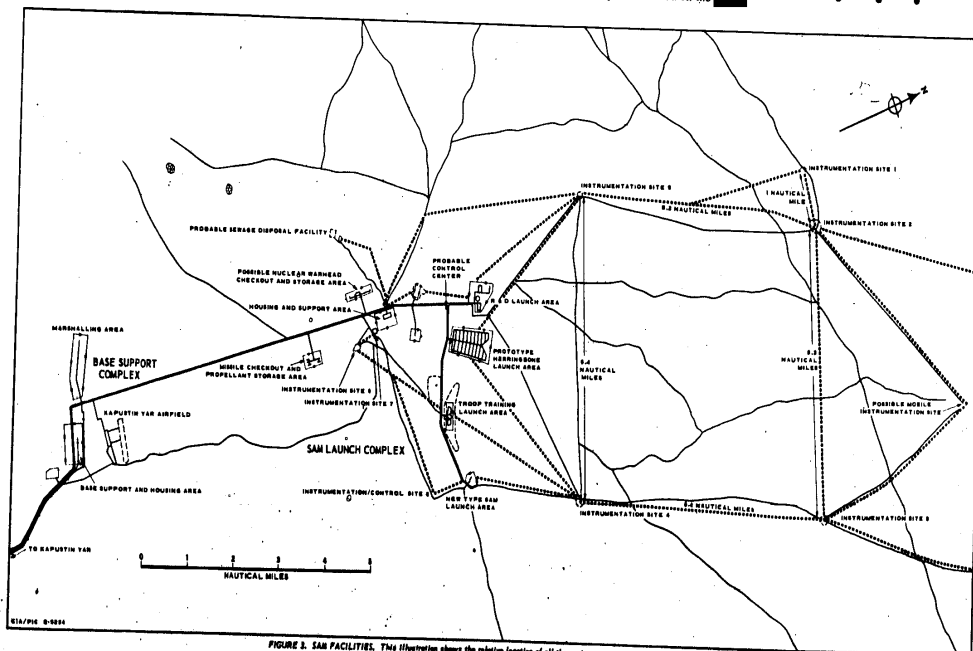


FIGURE 2. SAM FACILITIES. This illustration shows the relative location of all the various areas within the SAM Facilities.

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SAM LAUNCH COMPLEX

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The SAM Launch Complex is located in the approximate center of the SAM Facilities, with the associated test range to the north-northeast and the Base Support Complex seven nautical miles to the south-southwest (Figure 3). The complex con-

Checkout and Propellant Storage Area, and an instrumented test range. The four launch areas, which include the R&D Launch Area, the Prototype Herringbone Launch Area, the Troop Training Launch Area, and the New Type SAM Launch Area, are located along a roughly northwest/southeast line. Each launch area has its own associated guidance facilities. These four launch areas, coupled with the three support areas and the associated test range, together comprise the SAM Launch Complex. A discussion of each follows.

R & D LAUNCH AREA

The R&D Launch Area (Figure 4), which appears to be the oldest of the four active launch areas, is located along the main road that serves the SAM Launch Complex from the SAM Base Support Complex (Figure 3). This launch area, which was probably used to develop both the SA-1 (B-200) and the SA-2 systems, consists of five launch sites and a guidance site. The main power line from the SAM Base Support Complex terminates at the guidance site. A water line also appears to terminate at this site. The R&D Launch



FIGURE 4. PHOTO ENLARGEMENT OF THE R & D LAUNCH AREA AND PROTOTYPE HERRINGBONE LAUNCH AREA.

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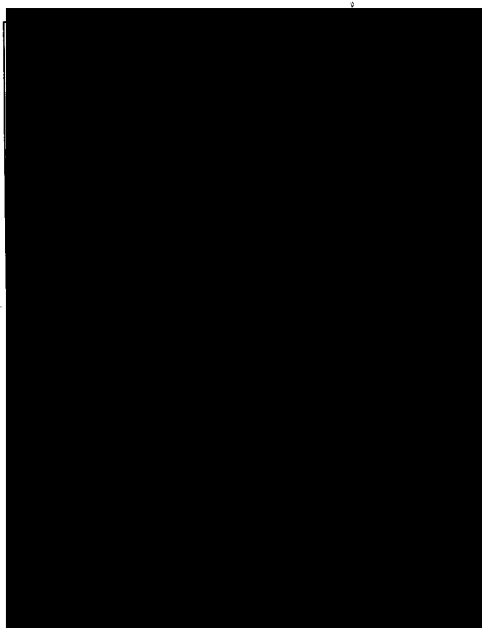
Area appeared active in [REDACTED] and was probably still engaged in R&D work for improvements of the SA-1 and SA-2 systems. The area also probably serves as a troop training facility.

LAUNCH SITES

The R&D Launch Area has five launch sites enclosed by a common fence (Figure 5). Since the R&D Launch Area has served for the development of both the SA-1 (B-200) and the SA-2 systems, the launch sites include launch facilities for the SA-1 system as well as launch and guidance for the SA-2 system. The guidance site for the SA-1 system is found 11,500 feet south of the launch sites.

The fenced area that encloses all five launch sites is located at the terminus of the all-weather road that serves the SAM Launch Complex from the SAM Base Support Complex. A security building (Item 1, Figure 5) is situated at the entrance to the fenced area, and an earth-covered bunker (Item 2) is adjacent to the security building. Within the fenced area are two 6-launcher segments (Sites "A", "C") of the SA-1 system, a soft SA-2 site ("B") complete with guidance, a partially prepared SA-2 site ("E"), and a site ("D") which apparently is not associated with any known system. Four of these sites ("A", "C", "D") appear active at the time of photography and may serve as an R&D facility for new or modified missiles. In addition, the sites may also serve as a demonstration facility in the training cycle of SAM troops. The fenced area which includes the launch sites has been expanded to the south since [REDACTED] but there has been no construction within the expanded area.

Launch Site "A": This site, which is a six-launcher segment of a Herringbone-



type site, was present in [REDACTED] (Figure 5). It includes two launch roads, each having three launch points with SA-1 missile launchers. A covered unidentified missile is situated on one of the launchers (Item 3), and a transporter with a possible missile (Item 4) is parked on the same launch road. Located between the launch roads is a control bunker (Item 5). Drifting snow and lack of relief preclude an accurate determination of the configuration of this bunker. However, it is in the same relative

location as the control bunker found at operational Herringbone sites. A small structure positioned adjacent to each launcher probably serves as its control point. A water tower [REDACTED] in diameter (Item 6) is located near the control bunker. Two circular pads 85 feet in diameter (Items 7, 8) are located adjacent to one of the launch roads. One pad (Item 7) is unoccupied, while two, or possibly three, unidentified vehicles are parked on the other pad (Item 8). Paint circular markings with radiating

lines are found on both pads. These pads are probably associated only with the R&D launching or guidance of missiles, since they are not found at operational Herringbone sites.

Launch Site "B": This site, completed or in a late stage of construction in [REDACTED] is a soft, circular, hexadic-type site (Figure 5). It has six launch points located at equal intervals along the inside of a perimeter road (possibly concrete). Each launch point is approximately square in shape and has an SA-2 launcher. Three, or possibly four, of the launchers have a Guideline missile on them. In the center of the site is a circular unrevetted guidance pad (possibly concrete) (Item 9), which is connected by an access road (possibly concrete) to the perimeter road. On the guidance pad there is a FRUIT SET radar and at least 13 vehicles. Buried cables extend from the guidance pad to each launch point, and in some cases interconnect individual launch points. A control building (Item 10), also connected by buried cable to the guidance pad, is situated south of the service road. Adjacent to this building, a FRUIT SET radar and at least five vehicles are parked on a hardstand (Item 11). Parked in the open near Site "B" are four SA-2 launchers, two of which have Guideline missiles on them.

Launch Site "C": This launch site (Figure 5), a six-launcher segment of a Herringbone-type site, is very similar to Launch Site "A". The site also has two launch roads, each having three launch points with SA-1 launchers. There are three missile transporters located on the launch roads. Between the launch roads there is a circular control bunker [REDACTED] in diameter (Item 12). A water tower [REDACTED] feet in diameter is located adjacent to the

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bunker. This site has three circular concrete pads (Items 13, 14, 15) positioned in a triangle around and approximately equidistant from the control bunker. The pads, which were present in [REDACTED] are 85 feet in diameter. One (Item 13), situated astride a launch road, is a launch point of the Herringbone segment. The other two pads (Items 14, 15) are served by all-weather access roads (possibly concrete). Although they are situated just inside the perimeter road on the south side of the site, one (Item 15) is served by an access road leading diagonally from the other side of the site. The pad, which is a launch point (Item 13), is connected to the diagonal access road by a Y-shaped service road. An earth-covered bunker (Item 16) is also serviced from the diagonal road. Faint circular markings and radiating lines are found on each of the three pads. The exact function of these pads has not been determined, although they are probably involved in the R&D phase of launching or guidance of missiles.

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Launch Site "D": This site, complete or in a late stage of construction in [REDACTED] does not appear to be designed to test a specific launch system (Figure 5). It contains three circular concrete pads (Items 18, 19, 20), all of which are marked by faint concentric circles and radiating lines. Two of the pads (Items 18, 19) are probably launch points. One (Item 18) is [REDACTED] in diameter, with concentric circular markings [REDACTED] in diameter. Parked on the pad are three vehicles and an unidentified object, the latter at the center of the pad. A Guideline missile on a transporter is parked on the other of the two pads probably used as launch points (Item 19). The third circular pad (Item 20) is probably used as a service pad. Adjacent to it is a triangular parking

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area (Item 17) with two Guideline missiles on transporters.

This site also contains two excavations (Items 21, 22). One (Item 21) is a typical SA-2 launch emplacement (launch point), and is unoccupied. The other excavation (Item 22) appears incomplete and may be a launch point under construction. The site also has an earth-covered bunker (Item 23). Adjacent to the bunker is a small structure (Item 24) which is connected by buried cable to Launch Site "C".

Launch Site "E": This site (Figure 5), which has been constructed since [REDACTED] consists of two excavated Hexadic-type emplacements (launch points) (Items 25, 26) and a large revetment for guidance equipment (Item 27). Buried cables connect the guidance revetment with the two emplacements and with four possible future emplacements which would make this a complete Hexadic-type site. A buried cable also joins Launch Site "B" with the guidance revetment at this site. Though construction is apparently complete on the two emplacements and the guidance revetment, they are unoccupied. Trackage suggests that the launch emplacements may have been used, but there is no evidence of activity at the time of photography. The site is served only by unimproved roads.

R&D YO-YO GUIDANCE SITE

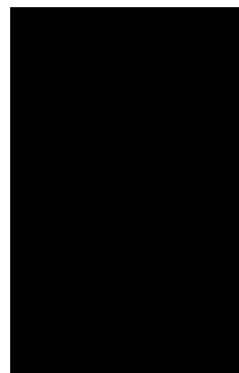
The R&D Guidance Site for the SA-1 system is located 11,500 feet south of the launch sites (Figure 6). This site contains a YO-YO radar (Item 1) situated along the north side of a large dumbbell shaped building (Item 2). This building probably contains the computing equipment for the YO-YO radar as well as other electronics

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equipment associated with its research and development. There are several other structures which probably serve as laboratory, administrative, and other support-type buildings. The site is solid-fenced except for a break between the radar and launch sites. A bore-sight pole (Item 3), present in [REDACTED] and located 660 feet in front of the radar, had been removed prior to [REDACTED]. However, the foundation for this pole is still evident on [REDACTED] photography, and a buried cable connects it with the radar. A buried cable also leads to the launch sites from the radar. Within the site, there are two water tanks, one of which is served by the main water line. The main power line from the Base Support Complex terminates here.

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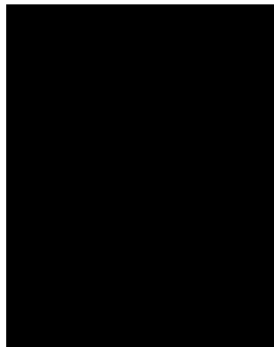
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TROOP TRAINING LAUNCH AREA 25X1D

The Troop Training Launch Area (Figure 9) which was under construction in [REDACTED] is situated along a branch of the main service road from the Base Support Complex (Figure 3). The area, which is probably used mainly to train SA-2 unit troops, consists of two partial prototype Hexadic sites for practice firing, six launch training sites, and a bivouac site. Only the practice firing sites are fenced. This area probably represents the third phase in the development of the SA-2 system. The initial work was

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probably carried out in the R&D Launch Area.

PRACTICE (LIVE) FIRING SITES

The two Practice Firing Sites, which are both partial prototype Hexadic sites, are surrounded by a common double fence (Figure 10). These sites, under construction at the time of [REDACTED] were undergoing expansion in [REDACTED]. Positioned between the two sites is a large hip-roofed building (Item 1) with a dormer on each end. Two small sheds are located in front of this building. To the rear of the two sites, and also within the fenced area, are 10 missile trans-

porters and two vans parked on concrete parking aprons. A security building is situated where the all-weather road serving the firing sites enters the fenced area. A system of internal all-weather roads is apparently designed for efficient access to all launch revetments. The following is a description of the two partial Hexadic sites.

Launch Site "A": This site (Figure 10) has four completed launch revetments (poins) and an elliptical guidance revetment in the center. Two other launch emplacements were started but construction has apparently been suspended. The launch revetments are more heavily constructed than those of the other launch

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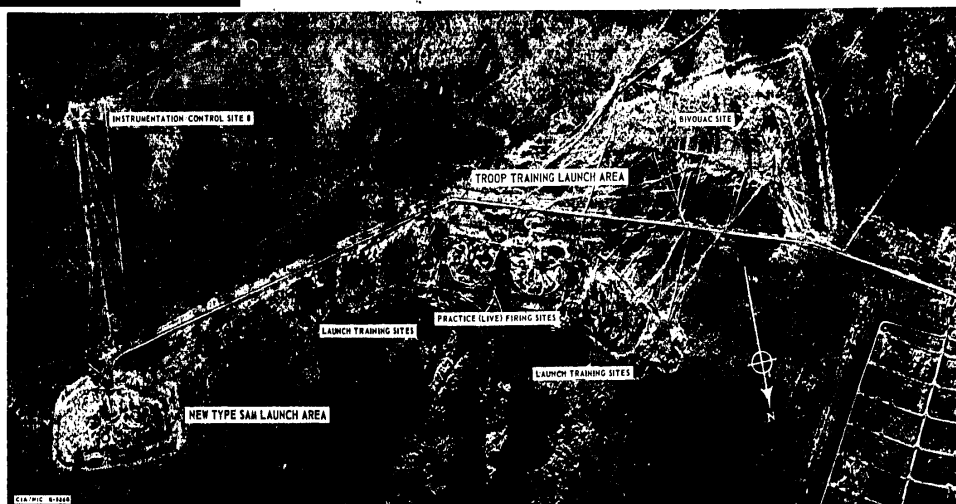


FIGURE 9. PHOTO ENLARGEMENT OF THE NEW TYPE SAM LAUNCH AREA AND TROOP TRAINING LAUNCH AREA.

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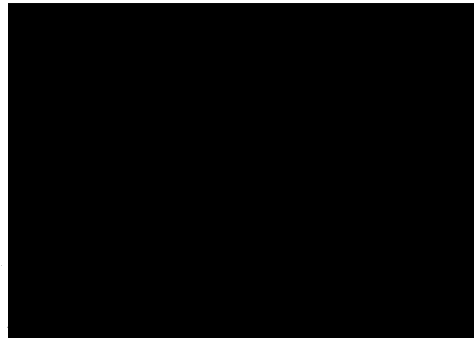
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site (Site "B"). A square hip-roofed building (Item 2) and a small water tower are located adjacent to the guidance revetment. This building is connected to a small possible generator building by buried cable. Located to the rear of the site is another small water tower and an unidentified square tower-like structure (Item 3) with a sloping top. This structure may have a parapet above the roof for the positioning of tracking equipment. ©

The launch and guidance revetments contain no launchers, missiles, or other equipment. Recent expansion at this site includes the extension of the fenced area 400 feet to the east-southeast, and the construction of a loop road within the expanded area.

Launch Site "B": This site (Figure 10) consists of three completed launch revetments (points). Construction had begun on three other launch revetments but was apparently suspended at the time of [REDACTED] photo coverage. The guidance facilities include two long excavations. This type of guidance facility as well as the revetment type used at Site "A" has been observed at operational SAM sites within the USSR. Other facilities at this site include a square hip-roofed building (Item 4), with an adjacent small water tower. This building, identical to the one at Site "A" (Item 2), is also connected to a possible generator building by buried cable. Between the hip-roofed building and the guidance excavation are four poles or masts. In addition, this site also has a small water tower and an adjacent unidentified structure (Item 5). This structure is the same type as Item 3, Site "A". Recent expansion at this site includes an extension of the fence line 400 feet to the west-northwest and construction of a loop road within the expanded area. Two hardstands



(Item 6), located along widened portions of the loop road, are connected to a third hardstand (Item 7) by ground scars. The construction of these two hardstands is not complete enough to determine their use, although they may serve as pads for instrumentation or missile launching. The fill on which this loop road is constructed is broken in two places, one where a construction road crosses it and the other where a drainage culvert is apparently being installed.

LAUNCH TRAINING SITES

There are six Launch Training Sites (Figure 9), three on each side of the fenced area containing the Practice Firing Sites. Each training site is divided into two three-launcher battery positions. There are seven batteries set up on four of the sites, and the two remaining sites are unoccupied. Each battery consists of a FRUIT SET radar, three SA-2 launchers, and seven vehicles. Equipment within the

Launch Training Sites consists of 7 FRUIT SET radars, 21 launchers, and 49 vehicles.

These sites are probably used to train the SA-2 crews in nearly every phase of missile launching except actual firing of the missiles. The actual firing probably takes place in the Practice Firing Sites positioned between the Launch Training Sites.

BIVOAC SITE

The Bivouac Site (Figure 9) is a large area which has been used for the temporary housing of troops. It is located between and to the rear of the Practice Firing Sites and the Herringbone Launch Site. At the time of [REDACTED] photography there were approximately 240 bases for pyramidal tents, but no tents. The ground pattern suggests that an area adjacent to the existing tent bases has also been used for temporary quartering of troops, but the number of additional tent bases is not evident on the photo-

graphy. The site is surrounded by firebreaks, but it is not fenced. Numerous tracks lead to the Practice Firing Sites, Launch Training Sites, and the Prototype Herringbone Launch Site.

Just northeast of the Bivouac Site is a possible training facility which consists of a rectangular hardstand 70 by 50 feet and six cleared circular areas. The circular areas, which are [REDACTED] in diameter, are positioned in a semicircle around the pad in a manner similar to the firing points in a hexadic site. This facility was not active at the time of [REDACTED] photography, but old track activity indicates it has been used extensively.

NEW TYPE SAM LAUNCH AREA

The New Type SAM Launch Area (Figure 9) is located at the terminus of a branch of the main service road from the Base Support Complex (Figure 3). This area, which probably represents the development of a third SAM system (SA-3), has been constructed since [REDACTED] Photography of that time showed no evidence of any construction at this area. It consists of two 4-position launch sites and an instrumentation/control site. The area is probably used for research and development of low- or medium-altitude short-range missiles, as well as for development of a prototype site.

LAUNCH SITES

The New Type SAM Launch Area has two launch sites enclosed by a common single fence (Figures 11, 12). An all-

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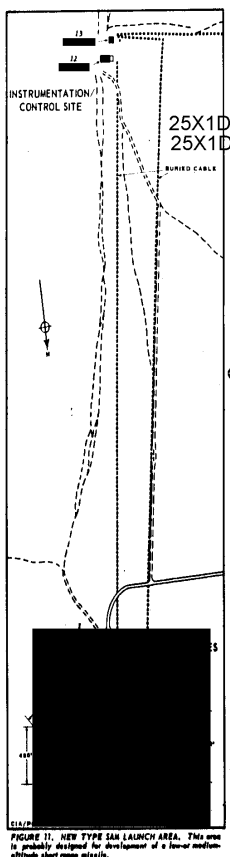


FIGURE 11. NEW TYPE SAM LAUNCH AREA. This area is probably designed for development of a low- or medium-altitude short-range missile.

weather (concrete) road provides access to these sites. This road is an extension of the road that serves both the Prototype Herringbone Launch Site and the Troop Training Launch Area. There were no indications of construction on the service roads or the launch sites in [redacted]. Located between and to the rear of these two sites, and within the fenced area, are six unidentified vehicles parked on a hardstand. A security building, (Item 1, Figure 11), three or four small sheds, a circular buried tank (Item 2), and a small square tower-like structure (Item 3), are also situated to the rear of these sites. A detailed discussion of the two launch sites follows.

Launch Site "A": This site (Figure 11) has four launch revetments (points) positioned around a large circular guidance revetment (Item 4). All the revetments are unoccupied. Construction was nearly complete on this site in [redacted] but some work was still in progress on the roads. A large control building (Item 5) is positioned adjacent to the guidance revetment. To the rear of this building are two possible buried tanks (Item 6). These possible tanks are positioned so that traffic coming in the access road will have to drive around them to serve two of the launch revetments. Each launch revetment and its service road is in the shape of a "T" (Figure 12), with the launch revetment at one end of the bar and the other half of the bar probably used to position the missile delivery vehicle prior to backing into the launch revetment. The half of the bar probably used to position the missile delivery vehicle could also serve as a temporary hold for extra missiles. Each launch revetment is separately served by an access road.



FIGURE 12. PERSPECTIVE OF NEW TYPE SAM LAUNCH SITES.

Launch Site "B": This site (Figure 11) has four non-revetted launch pads (points) positioned like "saw teeth" along a semi-circular access road. All these pads are occupied with some sort of equipment. One pad (Item 7) has what appears to be two missile-like objects approximately 25 feet long. Two other pads (Items 8, 9) have what appear to be covered missile launchers. The fourth pad (Item 10) has an unidentified object parked on it. Located to the rear of the site is a square hip-roofed building (Item 11) connected to a possible generator building by buried cable. The square hip-roofed building is nearly identical to the one found at Practice Firing Sites "A" and "B" in the Troop Training Launch Area (Items 2, 4, Figure 10). Positioned on a concrete pad in front of this building are a possible radar and three vans. The possible radar, which is not a FRUIT SET, is partially obscured by shadow. The reflector, which could be up to 20 feet across, is probably either a parabolic dish reflector or a cut parabolic reflector. It seems to be offset-mounted on a pedestal, probably from a small carriage, and has what appears to be a large feed mechanism.

INSTRUMENTATION/CONTROL SITE

An instrumentation/control site (Figure 11) is located 4,800 feet south of the fenced launch sites. Two buried cables connect it with the launch sites. The instrumentation/control site, which is not fenced, is served by an unimproved road and contains two buildings. One (Item 12) is a hip-roofed building with a flat-topped parapet on the roof. The other (Item 13) is a smaller, shed-type building at which all buried cables appear to terminate. This site is also connected to the range instrumentation system, and the relationship between them will be discussed under the SAM Test Range.

DISCUSSION AND ANALYSIS

Photography indicates that the New Type SAM Launch Area is designed for development of a new missile system, probably utilizing a low- or medium-altitude short-range missile. This launch area is probably intended to serve not only as a prototype site (Site "A") but also as an R&D test site (Site "B") for the

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new system. This hypothesis is substantiated by the fact that (1) Site "B" is apparently completed and is occupied with electronic equipment as well as some possible missiles, and (2) Site "A" is still in a state of construction, as indicated by the incomplete roadways to the pads and the apparent construction material still lying on the ground. In addition, there are no launchers, missiles, or guidance equipment located in the launch or guidance revetments of Site "A". The launch pads and guidance facilities at Site "B" are not revetted. This association of a soft site (Site "B") with an apparent prepared prototype site under construction (Site "A") follows the same phases of development as has been noted for both the SA-1 and SA-2 systems.

The location of the New Type SAM Launch Area relative to facilities associated with the SA-1 and SA-2 systems, and its tie-in to the existing range instrumentation is significant. The tie-in of the new system with the existing down-range instrumentation probably indicates that interception will be made at ranges no longer than those obtained with the SA-1 or SA-2 systems. This is especially true since the instrumentation existing in [redacted] has not been extended beyond the old sites.

The 25-foot possible missiles on the pad at Site "B" are indicative of a low- or medium-altitude short-range missile system. The size of the possible missiles correlates quite well with the size of the launch revetments at Site "A". In addition, the revetments at Site "A" are relatively shallow, allowing firing of a missile at a relatively low angle. The layout of the access roads to the launch revetments of Site "A" is inconsistent with the requirements for a Guideline-type trans-

porter. It is probable that the missiles will be transported on the equivalent of a 2.5 ton truck or possibly transporter-launchers. The use of only four pads at the new-system sites suggests that more than one missile will be positioned on each pad. Particularly is this so when compared to the six single-missile launching revetments at each SA-2 site. In addition, a low-altitude defense system would probably have a short operating range, and hence require multiple firing to increase the kill probability.

In determining the capabilities of the new system, it is important to note that the system has a range capability probably not exceeding that of the SA-1 and SA-2 systems, and probably has more than one missile per launch revetment.

In conclusion, indications are that the missile system under development at the New Type SAM Launch Area is not a refinement of the SA-2 system, but a new system utilizing a low- or medium-altitude short-range missile. The alternative possibility that the system being developed utilizes a high-altitude or long-range missile is not nearly as probable. The possibility that it is an anti-missile missile system is inconsistent with the characteristics of the equipment observed, and with the positioning of the site within the launch complex.

SAM TEST RANGE

The Test Range for the SAM Facilities is entirely independent of other instrumentation systems in the Kapustin Yar/Vladimirovka Missile Test Center (Figure 2). Launchings at the SAM Complex apparently can be conducted without

regard for those at the other complexes at the Center. The orientation of the SAM Test Range to the north-northeast, on a general azimuth of 20 degrees, precludes interference with firings at the SSMLaunch Complexes to the southeast, which are orientated approximately due east.

Instrumentation for the SAM Test Range consists of 8 sites, 5 forward and 3 to the rear (Figure 3). Most cable lines and roads from these sites appear to converge in the vicinity of Instrumentation Sites 6 and 7 and Section "B" of the Housing and Support Area. From Site 6, cable lines with paralleling roads and trails fan out to the five forward sites (Sites 1 through 5) and define the extent of the instrumented test range. Other cable lines also lead from some of the launch areas to two of the rear instrumentation sites (Sites 6 and 7).

The forward instrumentation sites (Sites 1 through 5) are situated at the corners of a large roughly square area, approximately 5.4 miles on a side. A projection of the center access road of the Prototype Herringbone Launch Site would pass through this roughly square area. The other three launch areas in the SAM Launch Complex, which are oriented in the same general direction, also use this test range. Instrumentation Sites 6 through 8 are located to the rear of the launch areas.

Each launch area has its own associated guidance facilities, which are discussed with the launch area to which they are related. In addition, a Probable Range Control Center is situated between the R&D Launch Area and the Prototype Herringbone Launch Area (Figure 3).

A discussion of the instrumentation sites and Probable Range Control Center follows.

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INSTRUMENTATION SITE 1

Site 1 (Figure 13) is located 8.2 miles from the Probable Range Control Center (Figure 3). It consists of two buildings surrounded by a roughly circular fire-

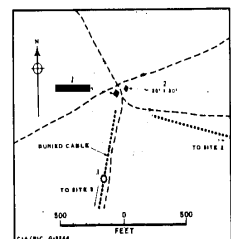


FIGURE 13. INSTRUMENTATION SITE 1.

break. One of the buildings (Item 1, Figure 13) has a steep gable roof, while the other (Item 2) has a relatively flat gable roof. Both buildings have a very small structure on the roof. The site has no security fence. Located just outside of the firebreak is a possible buried tank (Item 3). This site could not be identified on [redacted] photography.

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INSTRUMENTATION SITE 2

Site 2 (Figure 14), which is located 8.2 miles from the Probable Range Control Center, is roughly circular in shape and protected by three to four graded firebreaks. The main building (Item 1) is a square hip-roofed structure with five protrusions on top. One of these protrusions extends upward much higher than the other four. Near this building is a bunker (Item 2) with a drive-down ramp leading under it. In addition, there are two other small buildings (Items 3), an

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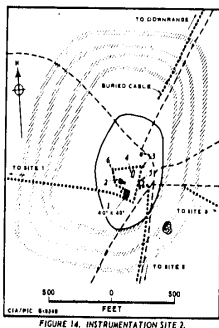


FIGURE 14. INSTRUMENTATION SITE 2.

excavation (Item 4), a possible buried tank (Item 5), and a probable generator building (Item 6), which is connected by buried cable to the main building and one of the smaller buildings. An unimproved road and several vehicle tracks serve the site. Buried cables lead to Sites 1, 3 and 5.

A possible buried cable leads down-range from this site and converges with the one from Site 3 at a forward point which may be a mobile instrumentation site. Though this mobile instrumentation site was unoccupied in [redacted] mobile-type instrumentation equipment could be moved to this point during firings.

INSTRUMENTATION SITE 3

Site 3 (Figure 15) is located 9.1 miles from the Probable Range Control Center. This site, which was present in [redacted] has no permanent buildings, but there is a building foundation within the site. It cannot be determined whether this is the foundation for a building under construction or for a building that has been razed.

A large excavation with a long narrow object being installed (Item 1) is located within the site. In addition, there is a lot of unidentified clutter lying within the site. The site is surrounded by at least three graded firebreaks. One unimproved road and several vehicle tracks lead to the site, and buried cables connect it with Sites 2 and 4. In addition, a possible

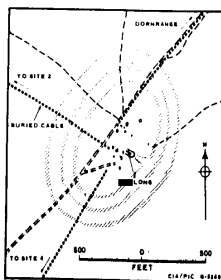


FIGURE 15. INSTRUMENTATION SITE 3.

buried cable leads to the possible mobile instrumentation site (see discussion of Site 2).

INSTRUMENTATION SITE 4

Site 4 (Figure 16) is located 4.5 miles from the Probable Range Control Center. Facilities include a steep gable-roofed building with two protrusions on top (Item 1). In addition, the site contains a flat-roofed building (Item 2), a relatively flat gable-roofed building (Item 3), two small unidentified structures, and two possible vehicles. This site is surrounded by at least two graded firebreaks, and is served by an unimproved road and several vehicle tracks. It is connected by buried cables

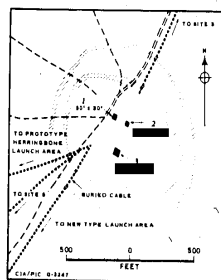


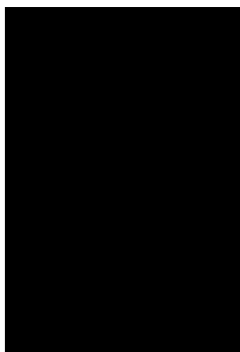
FIGURE 16. INSTRUMENTATION SITE 4.

to Sites 3 and 6 as well as the New Type SAM Launch Area and the Prototype Herringbone Launch Area. The buried cable to Site 6 passes through the Troop Training Launch Area.

INSTRUMENTATION SITE 5

Site 5 (Figure 17), which is located 3.6 miles from the Probable Range Control Center, consists of two adjoining sections. The larger is encircled by three graded firebreaks and the smaller by two firebreaks. Within the smaller section is an object (Item 1) which casts a shadow, but it cannot be determined whether the object is a structure or a mound of earth. The larger section has a fenced area containing two buildings. One (Item 2) has a flat roof with three protrusions arranged in line along the center of the roof, and the other (Item 3) has a steep gable roof with a protrusion on one side. Another object (Item 4), which appears partially buried, is also situated within this fenced area. Just outside the fence, but within the inner firebreak, is a possible buried tank (Item 5). Outside the firebreak, to the west

of the site, is a circular revetment which contains another possible buried tank (Item 6). The instrumentation site is characterized by heavy truck activity and is served by an unimproved road. Buried cables lead to Sites 1, 2 and 6 as well as



to the Prototype Herringbone Launch Area. The buried cable to Site 6 passes through the R&D Launch Area.

INSTRUMENTATION SITE 6

Site 6 (Figure 18) is located to the rear of the SAM launch areas, 2.1 miles south of the Probable Range Control Center. It has three structures, one steep gable-roofed building (Item 1), one flat-roofed building (Item 2), and a relatively flat gable-roofed building (Item 3). The site is surrounded by three or four graded firebreaks and is served by an unimproved road and several vehicle tracks. Buried cables extend from this site to Sites 4 and 5. A ground scar leads northward from

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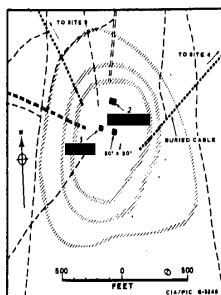


FIGURE 18. INSTRUMENTATION SITE 6.

this site to join a similar ground scar from Instrumentation Site 7.

INSTRUMENTATION SITE 7

Site 7 (Figure 19) is located east of Section "B" of the Housing and Support Area and 1.5 miles south of the Probable Range Control Center. It consists of three

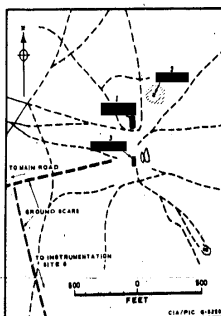


FIGURE 19. INSTRUMENTATION SITE 7.

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buildings and an excavation, possibly for a building foundation. One of the buildings (Item 1) has a relatively flat gable roof. Another is a small building (Item 2), roof type undetermined, surrounded by a graded firebreak. The third building (Item 3), which appears to be the most important one at the site, has a structure on the roof which may be a radar or some other type of instrument. A ground scar leads from this site to a point on the main road serving the SAM Launch Complex, where it joins one of several ground scars which extend along the main road from the vicinity of the SAM Launch Complex to the Base Support Complex. This ground scar is also joined by the one from Site 6 at a point 310 feet west of Site 7.

INSTRUMENTATION/CONTROL SITE 8

Site 8 (Figure 20) is located behind the New Type SAM Launch Area, 3.3 miles east of the Probable Range Control Center.

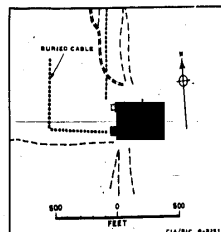


FIGURE 20. INSTRUMENTATION/CONTROL SITE 8. This site was not present in 1960.

The site consists of two buildings. One (Item 1) is a hip-roofed building with a flat-topped parapet on the roof, and the other (Item 2) is a small shed-type build-

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ing. Buried cables lead from the small building to the New Type SAM Launch Sites and to a point near Instrumentation Site 7. This site was not present in 1960.

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PROBABLE RANGE CONTROL CENTER

The Probable Range Control Center for the SAM Launch Complex (Figure 2)

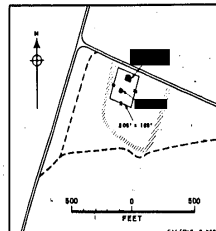


FIGURE 21. PROBABLE RANGE CONTROL CENTER.

is located 3,300 feet to the rear of the R&D Launch Sites (Figure 3). It is forward of and approximately equidistant from the R&D and Prototype YO-YO Guidance Sites. The center consists of a fenced area 205 by 165 feet surrounded by three graded firebreaks. It contains one main building 45 by 30 feet and 10 feet high, and one support-type building 10 feet square. On the roof of the main building there are several pieces of equipment which are probably used for tracking and communications. In the center of the front of this building a wing-like structure 10 feet long extends out and rises 10 feet higher than the building. Each end of this wing-like structure is cylindrical in form and is capped with a dome 10 feet in diameter. These cylindrical forms

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extend from the ground up and constitute an integral part of the wing-like structure.

Although the Probable Range Control Center is not centrally located with respect to all launch areas, it is so located with respect to the R&D and Prototype Herringbone Launch Areas, the first two constructed. Ground scars on 1960 photography indicate that this center existed at that time, but the buildings could not be identified from that photography. Buried cables probably lead from the center along the service roads to at least two of the launch areas.

HOUSING AND SUPPORT AREA

The Housing and Support Area (Figure 22) is located adjacent to the road that connects the SAM Base Support Complex to the SAM Launch Complex (Figure 3). The area is divided into two fenced sections, "A" and "B". In addition, there are three tent sites, two old and one new. There is no change in the fenced areas since 1960 except for the addition of a few buildings.

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SECTION "A"

The larger of the two sections, Section "A" (Figure 22), measures 1,890 by 2,800 feet and covers 121 acres. It contains approximately 19 barracks-type buildings, 3 motor pools, a recreation area, a small heating plant, and numerous support-type buildings. Another probable barracks building was under construction in 1960. The completed barracks buildings are two-story and have

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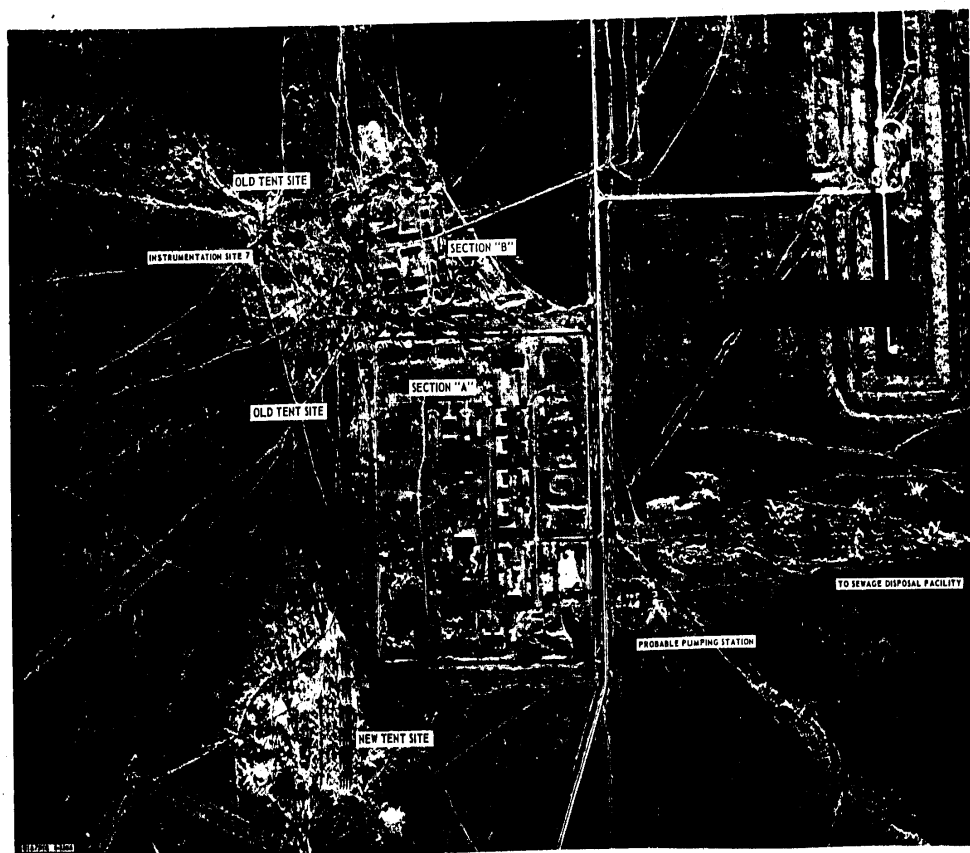


FIGURE 22. PHOTO ENLARGEMENT OF HOUSING AND SUPPORT AREA.

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a total floor space of 386,700 square feet; however, some of these buildings could be used as classrooms rather than living quarters. Equipment in the motor pools in [REDACTED] included 81 trucks, 16 dump trucks, 3 cranes, 18 possible trailers, 38 unidentified vehicles, and 6 pieces of miscellaneous equipment. This section probably serves as a housing area for support, school, and technical personnel. In addition, the area provides vehicular and maintenance support for the SAM Launch Complex.

A probable pumping station is located immediately west of this section. A buried pipeline leads 7,000 feet west from the section to an open ditch which continues 4,500 feet further to a probable sewage disposal facility (Figure 3).

SECTION "B"

Section "B" (Figure 22), located a short distance to the south of Section "A", measures 750 by 650 feet and contains approximately 11 acres. This section has 8 storage-type buildings 180 by 30 feet, one administrative-type building, an earth covered bunker, and several small miscellaneous buildings.

OLD TENT SITES

Just southeast of Section "B" is an old tent site with approximately 40 tent bases (Figure 22). Another old tent site with approximately 70 tent bases lies adjacent to the southeast corner of Section "A". These two tent sites appear to have been out of use for some time prior to [REDACTED]. They probably are the remains of temporary housing sites for construction workers.

NEW TENT SITE

A new tent site with approximately 142 tent bases is located northeast of Section "A" (Figure 22). Ninety-two of the tent bases and one T-shaped probable mess hall building are enclosed by a double fence. The other 50 tent bases are outside the fence. This site appears much newer and was probably used during the summer of [REDACTED] for housing of troops assigned here for training.

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MISSILE CHECKOUT AND PROPELLANT STORAGE AREA

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The Missile Checkout and Propellant Storage Area (Figure 24), present in [REDACTED] is located 1.9 miles south of the Housing and Support Area (Figure 3). It is served by an all-weather (probable concrete) access road from the main road to the SAM Launch Complex. The area which is double-fenced, has guard towers, and has a security building at the entrance. Situated within the area are eight revetted buildings, each served by an all-weather road; a revetted spherical or upright tank adjacent to a small building (Item 1, Figure 24); one gable-roofed drive-through building (Item 2); one square building under construction (Item 3); and several small shed-type structures.

This area has several buildings very similar to those found at the support facilities associated with operational SAM defense systems. Nearly all buildings at these operational facilities, except the large drive-through checkout/maintenance building, have counterparts in the Missile Checkout and Propellant Storage Area. This area probably serves the SAM Launch Complex in the same way the operational support facilities serve launch

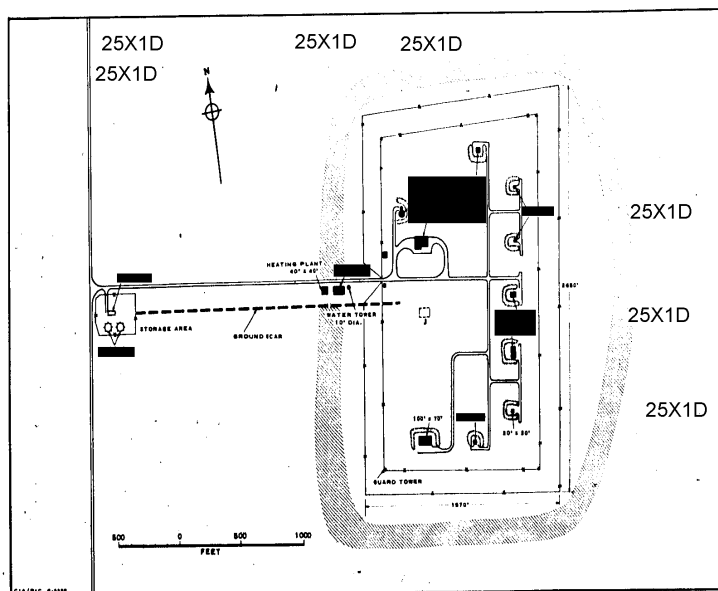


FIGURE 24. MISSILE CHECKOUT AND PROPELLANT STORAGE AREA. This area has several buildings and revetments similar to those found at the support facilities associated with operational SAM defense systems.

sites around the defended areas. The additional revetted buildings are probably used for propellant storage.

Located just outside the fenced area

there is a small water tower, a heating plant, and another building. Situated near the junction of the access road and the main road is a fenced site containing a

building and two buried tanks. A ground scar connects this fenced site with the Missile Checkout and Propellant Storage Area.

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BASE SUPPORT COMPLEX

The Base Support Complex for the SAM Facilities (Figure 25) covers an area of approximately 9 square miles. It is located 7 nautical miles south of the SAM Launch Complex and 4 nautical miles north-northwest of Kapustin Yar (Figure 3). The complex, which includes the Base Support and Housing Area, the Marshalling Area, and Kapustin Yar Airfield, lies astride the main road leading to the SAM Launch Complex, and is the terminus of a rail spur from Kapustin Yar.

BASE SUPPORT AND HOUSING AREA

The Base Support and Housing Area is located 7 miles south of the SAM Launch

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Complex and 4 miles north-northwest of Kapustin Yar (Figure 3). The area includes a Base Support Section, a Housing Section, two Possible Storage Sections, and a Transloading Site (Figure 26). Additions made to the area since [REDACTED] are shown in green. This area is served by both road and rail. The main road to the SAM Launch Complex passes through the large fenced portion, separating the Base Support Section from the Housing Section. Another all-weather road extends to Kapustin Yar Airfield. The rail spur from Kapustin Yar serves the Base Support Section and the Transloading Site. The dimensions of the main buildings are indicated on Figure 26. Vehicles shown on this line drawing appear on [REDACTED] photography.

BASE SUPPORT SECTION

The Base Support Section (Figure 26), which lies north of the main road to the SAM Launch Facilities, contains 53 buildings, 8 of which have been built since [REDACTED]. This section has a separately-fenced motor pool with a large maintenance building. Another part of this section, enclosed by a solid fence, probably serves as an area for receiving and assembling SAM missiles. This fenced portion is both rail and road served and has two road drive-through buildings, and eight support buildings. The presence of this facility in the Base Support Section could account for the absence of a large assembly building in the Missile Checkout and Propellant Storage Area. This large assembly building is usually found at support facilities associated with operational SAM Sites. In addition, there are also two probable barracks within the

fenced area and two more barracks just outside the fence. Other buildings within the Base Support Section are probably used as laboratories, machine shops, and fabrication, maintenance, and storage buildings.

HOUSING SECTION

The Housing Section lies south of the main road to the SAM Launch facilities (Figure 26). Housing facilities include 362,230 square feet of floor space in apartment and family units and 17,800 square feet in barracks. Based on 650 square feet of living space per family in apartments and family dwellings and 150 square feet per person in barracks, the Housing Section has accommodations for an estimated total of 1,240 adults. Since the 4 barracks in the Base Support Section have space for an additional 260 persons, the estimated total adult population of the

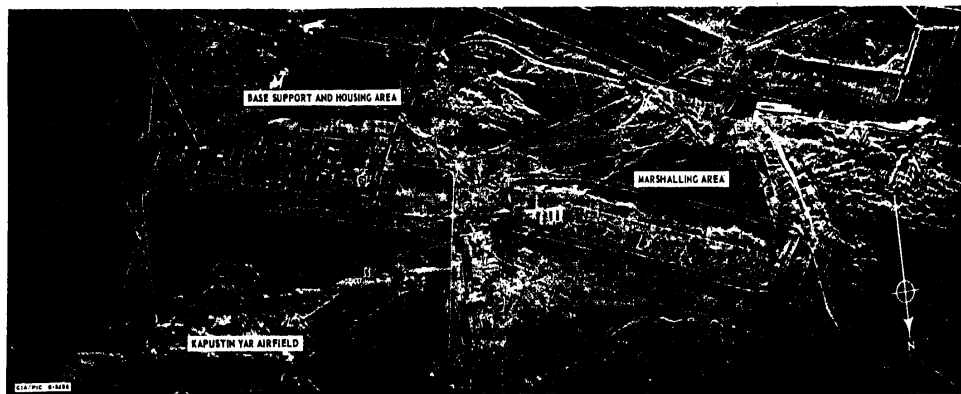


FIGURE 25. PHOTO ENLARGEMENT OF THE SUPPORT COMPLEX.

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Base Support and Housing Area is 1,500 persons. In addition, the Housing Section has a large administration building, a few storage buildings, and a recreation center. The main intake water line from the Volga River leads into this section.

POSSIBLE STORAGE SECTIONS

The smaller of the two possible storage sections adjoins the eastern end of the Housing Section and is separately fenced (Figure 26). It contains seven

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buildings, five of which have been built since [REDACTED]. The other possible storage section, situated 1,800 feet to the south, is surrounded by a solid fence. This section contains 15 storage-type buildings and a separately-fenced motor pool with 3 buildings and at least 60 vehicles.

TRANSLOADING SITE

The Transloading Site is located near the junction of all-weather roads leading

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to the Marshalling Area and the SAM Launch Complex (Figure 26). The rail spur serving this site was under construction, and nearly complete, in [REDACTED]. Near the terminal end, it branches into three tracks. At the time of [REDACTED] photography, a train with two launchers and six vans or trailers was located on the middle track. Another train, loaded with 12 launchers, was being backed in on the track next to the transloading hardstand. Thirty-six vehicles were parked within the site.

MARSHALLING AREA

The Marshalling Area (Figure 27), present but under construction in [REDACTED], is located west of the Base Support and Housing Area, 7 miles south of the SAM Launch Complex (Figure 3). It is double-fenced and is served by a concrete access road that extends the full length of the area. A security building is positioned at the entrance of the access road. Along this road are five equipment checkout and storage pads with equipment

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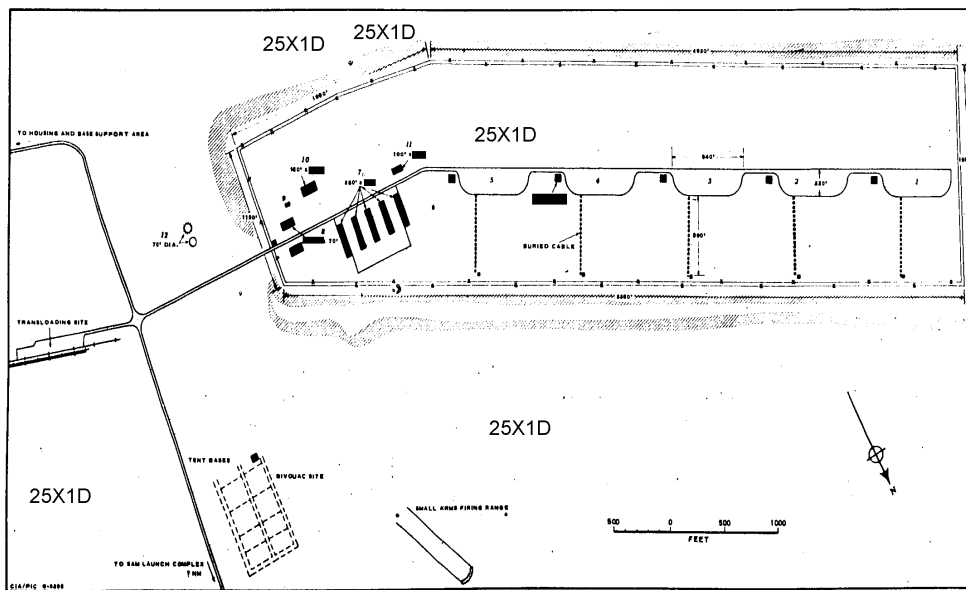


FIGURE 27. MARSHALLING AREA. This area probably serves as an equipment issue point for SA-2 units. Some technician training may also take place here.

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on them. Each pad is connected by buried cable to a probable checkout beacon positioned 590 feet from the pad. A square hip-roofed building is situated beside each pad. These buildings are similar, if not identical, to the ones found at the Troop Training Launch Area (Items 2, 4, Figure 10), and the one at the New Type Launch Area (Item 11, Figure 11).

EQUIPMENT

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Parked on the equipment checkout and storage pads in [REDACTED] were elements of several SA-2 units. The following is a list of the equipment identified within the area. Item numbers correspond to those on the accompanying graphic (Figure 27).

Item 1: 4 FRUIT SET radars; 24 probable launchers; 52 other vehicles, type undetermined.

Item 2: 6 FRUIT SET radars; 27 probable launchers; 50 other vehicles, type undetermined.

Item 3: 4 FRUIT SET radars; 30 probable launchers; 53 other vehicles, type undetermined.

Item 4: 6 FRUIT SET radars; 22 probable launchers; 54 other vehicles, type undetermined.

Item 5: 3 FRUIT SET radars; 33 probable launchers; 68 other vehicles, type undetermined.

Item 6: 87 vehicles, type undetermined.

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There are approximately 85 other vehicles scattered throughout the area, making the total equipment count in the Marshalling Area, 23 FRUIT SET radars, 136 probable launchers, and approximately 364 other vehicles. Two of the equipment checkout and storage pads (Items D, E) were occupied in [REDACTED] but a vehicle count could not be made from that photography.

OTHER FACILITIES

The other facilities located within the Marshalling Area are concentrated near the entrance of the access road. These facilities include five checkout and storage buildings (Items 7, Figure 27), two 2-story barracks buildings (Items 8), a small thermal plant (Item 9), a probable maintenance building (Item 10), and a small probable storage building (Item 11).

Just outside the fenced area are two buried tanks, probably for POL storage. One of these (Item 12) was being installed at the time of [REDACTED] photography.

Just north of the Marshalling Area, along the main road to the SAM Launch Complex, is a bivouac site containing 120 tent bases and a large probable mess hall. This site is prepared so as to accommodate 120 more tent bases, but the bases are not present. There is a small-arms range nearby, and the site is marked with numerous tracks. Though there was activity at this site in [REDACTED] the

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presence or absence of tents could not be determined. The small-arms range was under construction at that time.

A rail and road transloading facility is located east of the Marshalling Area. This facility, which was present in [REDACTED] is discussed with the Base Support and Housing Area (Figure 26).

DISCUSSION AND ANALYSIS

The Marshalling Area is probably involved in the equipping and activating of new SA-2 units. Some factors which tend to support this conclusion are: (1)



The equipment is probably received, checked-out, and the electronic equipment calibrated prior to issue to the SA-2 units. The troops operating the Marshalling Area probably process equipment for at least five units simultaneously. This assumption is based on [REDACTED] photography.

A study of the [REDACTED] photo-

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tography shows that the Marshalling Area and the transloading site adjacent to it were essentially completed and were operational, even though there was some construction still in progress. This suggests that the Marshalling Area and transloading site were newly constructed in [REDACTED] to perform a specific function in connection with the SA-2 system, which was approximately in the same stage of development.

KAPUSTIN YAR AIRFIELD

Kapustin Yar Airfield, located north of the Base Support and Housing Area, is a sod landing strip 4,500 to 5,000 feet long and 600 feet wide, oriented east/west, with a 1,700 foot overrun at the east end (Figure 25). Facilities include two helicopter pads, ILS equipment, an abandoned firing butt, several revetments, and a maintenance/support area containing 16 small maintenance/utility buildings and 18 vehicles. Aircraft present at the time of [REDACTED] photography included 6 CAB, 2 CRATE, 4 COLT, 10 CREEK, and 8 HOUND. The two helicopter pads are situated at either end of the field and are served by new all-weather roads. At the eastern end of the airfield, near the helicopter pad, there is a small fenced enclosure containing a single small building. Eight trucks are parked just outside this enclosure.

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INITIAL SAM LAUNCH COMPLEX

The Initial SAM Launch Complex, now inactive or abandoned, is situated 15 miles northeast of Kapustin Yar, and 10 miles east of the active SAM Launch Complex (Figure 2). It consists of a Launch Area and a Support Area situated one

mile apart. The Support Area is served from Kapustin Yar by an improved road, probably gravel surfaced. An unimproved road connects the Launch Area with the Support Area. A buried cable leads south-eastward from the Support Area toward

the Surface-to-Surface Missile Facilities. This buried cable is probably part of a rangehead communications system connecting the various launch facilities.

The Launch Area covers about 45 acres and contains two rectangular concrete launch pads, a circular possible launch pad, a control bunker, and six revetments. Nine cargo trucks and four

smaller vehicles are parked just west of the area, but do not appear to be associated with it.

The Support Area covers approximately 80 acres and contains 5 buildings and 34 old tent bases. A large section in the southern part of the area is scarred, and it appears that buildings formerly occupying it have been razed.

TABLE OF LOCATION OF AREAS WITHIN THE SURFACE-TO-AIR MISSILE FACILITIES

COMPLEX	AREA	COORDINATES*	ACTIVITY
SAM LAUNCH COMPLEX	II & D LAUNCH AREA	Launch Site 48°48'20"N-45°44'15"E	4 of 5 sites have some equipment
		Guidance Site 48°47'05"N-45°43'30"E	Truck Activity
	PROTOTYPE HERRINGBONE LAUNCH AREA	Launch Site 48°47'55"N-45°45'25"E	29 Guideline missiles on dillies
		Guidance Site 48°46'50"N-45°44'28"E	27 V-301 type missiles on launchers or trailers
			Truck Activity
	TRHOOP TRAINING LAUNCH AREA	48°46'59"N-45°46'55"E	21 Launchers, 10 probable trailers
			7 FRUITSET Radars, 49 other vehicles
	NEW TYPE SAM LAUNCH AREA	48°46'59"N-45°48'45"E	2 possible missiles, 2 possible launchers, possible electronic equipment
25X9	HOUSING AND SUPPORT AREA	48°46'20"N-45°43'48"E	Truck Activity
	MISSILE CHECKOUT AND PROPELLANT STORAGE AREA	48°44'35"N-45°43'50"E	Truck Activity
BASE SUPPORT COMPLEX	MARSHALLING AREA	48°39'45"N-45°41'00"E	23 FRUITSET Radars
			136 probable launchers, approximately 360 other vehicles
	BASE SUPPORT AND HOUSING AREA	48°39'05"N-45°43'00"E	Truck Activity
INITIAL SAM LAUNCH COMPLEX	KAPUSTIN YAR AIRFIELD	48°40'10"N-45°43'30"E	6 CAR, 4 COLT, 8 HOUND, 2 CRATE, 10 CREEK
	LAUNCH AREA	48°46'45"N-46°03'10"E	Inactive or abandoned
	SUPPORT AREA	48°45'15"N-46°03'40"E	Inactive or abandoned

* Coordinates are for the center of the site or area

** Small scale of photography precludes determination of activity

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CONCLUSIONS

The Surface-to-Air Missile Facilities probably operate independently of other missile facilities at the Kapustin Yar/Vladimirovka Missile Test Center.

Two missile systems, SA-1 and SA-2, have been developed at the SAM Facilities.

The development of the SA-2 system was begun prior to [REDACTED] 25X1D

A low- to medium-altitude short range SAM missile system is probably under development at the New Type SAM Launch Area.

Troop training appears to be one of the most important functions of the SAM Facilities. This includes facilities for training several SA-2 crews simultaneously as well as facilities for classroom training of a large number of troops.

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The Marshalling Area probably serves as an issue point for equipping trained SA-2 crews being deployed to operational sites.

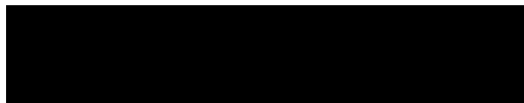
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PIOTO DATA:



MAP REFERENCES:

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